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A COMPARISON OF FITNESS RATINGS TO EXERCISE PATTERNS AND MOTIVATIONS AMONG COLLEGE STUDENTS

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Abstract

This study compares fitness ratings with exercise patterns and motivations within a sample of college students. Study participants (n=172) were recruited to complete an online survey about their exercise patterns and motivations, and to participate in a round of fitness assessments. Exercise motivations were measured using the Exercise Motivations Inventory-2, and five fitness assessments were selected to represent body composition, muscular strength, muscular endurance, aerobic capacity, and flexibility. Cluster analyses were completed to group the participants according to their fitness assessment results, and ANOVA and χ^2 tests identified differences in motivations across the fitness groups. Differences in both gender and self-reported physical activity patterns were also identified across the fitness groups. The fitness cluster groups differed across six of the EMI-2 motivational factors. The differences in motives across the fitness groups identify clear trends demonstrating self-determined versus extrinsic motivations, however, they also lead to questions regarding the multiple meanings particular motivation components may have. Exercise patterns reported by participants were consistent with their placement in the fitness groups.

INTRODUCTION

There are significant benefits to a physically active lifestyle as well as consequences for inactivity. Some of the well-documented benefits of meeting minimum physical activity recommendations (Haskell et al., 2007) can be living longer, a reduced risk of heart disease and/or stroke, better weight control, better academic achievement in students, and less risk of depression (Centers for Disease Control and Prevention [CDC], 2014). In a 2014 report, the Center for Disease Control (CDC) found that 52.1% of male and 42.6% of female U.S. adults met the ACSM guidelines for physical activity, with younger adults being more likely to meet the guidelines as compared to older adults (CDC, 2014). The trend of decreasing physical activity patterns from early to later adulthood could make one hope that younger adults are adopting healthy patterns. However, the spring 2014 National College Health Assessment (CDC, 2007) found that only 53% of male college students and 49% of female college students reported meeting the minimum recommendations. As a demonstration of this concern, Healthy Campus 2010 included physical inactivity in the six priority health risk behaviors among college students, leading to Healthy Campus 2020 identifying a 10% improvement as a key student objective (American College Health Association [ACHA], 2002).

Increasing the physical activity patterns of college students is a priority as demonstrated in Healthy Campus 2020. Efforts to do this include a significant body of research about physical activity patterns among college students and about strategies for reversing the inactivity trend. One of the conclusions in a meta-analysis of physical activity behaviors of college students was a call for multi-level approaches to understand and improve college student physical activity behaviors (National College Health Association, 2002). The current study does so by comparing actual fitness measures to self-reported physical activity patterns and exercise motivations with the goal of identifying strategies that may help to increase the proportion of college students who sustain healthy exercise habits.

The bulk of available physical activity statistics, particularly within the context of college students, are based on survey research and represent respondent-reported activity levels (Ebben & Brudzynski, 2009; Ingledew, Markland & Ferguson, 2009; Keating, Guan, Pinero, & Bridges, 2005;; Lutz, Karoly, & Okun, 2008; Teixeira, Carraca, Markland, Silva, & Ryan, 2012). Some research comparing self-reported fitness with actual fitness measures has been conducted, however, many of these studies relate only to body composition (Banegas-Banegas, & Guallar-Castillon, 2002; Gutierrez-Fisac, Lopez-Garcia, Rodriguez-Artalejo, Jacobson & DeBock, 2001; Morrissey, Whetstone, Cummings, & Owen, 2006; Palta, Prineas, Berman, & Hannan, 1982), or reflected a unique population such as children, or physical education instructors (Brandon & Evans, 1988; Lamb & Haworth, 1998;). A limited body of research has made this connection for the college student demographic. Monroe et al. (2010) compared the Physical Self-description Questionnaire responses of 60 college students to their results in four measures of fitness and found students could gauge their own fitness with some degree of accuracy. Clearly, more research that validates self-reported physical activity with actual measures of fitness is needed.

Similarly, little research has examined the relationship between what motivates people to exercise and their measured fitness ratings. One particularly relevant study was completed by Wilson et at. (2003) who examined self-determination theory components over the course of a 12-week prescribed exercise program and found the components of motivation that related most strongly to physical fitness (VO_{2max}) were competence and autonomy. This study seeks to expand on the Wilson et al (2003) findings by evaluating a greater variety of fitness measures.

Exercise motivations, independent from measures of fitness, have been thoroughly researched for a variety of demographics and within many specific contexts (Teixeira et al., 2012). Self-determination theory (Deci & Ryan, 1985; Ryan & Deci, 2000) has been commonly used to study exercise participation, and a growing body of literature demonstrates the importance of intrinsic motivation, including competence, autonomy, and psychological relatedness as intrinsic needs central to sustained exercise behavior patterns (McDonough & Crocker, 2007; Markland & Tobin, 2010; Thøgersen-Ntoumani & Ntoumanis, 2006). Self-determined regulations have been found to be a particularly important predictor of exercise, especially when considering the likelihood of sustaining the exercise (Matsumoto & Takenaka, 2004; Mullan & Markland, 1997; Standage, Sevire, & Loney, 2008). Extrinsic motivations, by contrast, have mostly been found to either have little or no association or to be negatively associated with exercise participation (Ingledew & Markland, 2008; Teixeira et al., 2012). However, in some contexts external regulation has been found to be positively associated with physical activity. For example, introjected regulation, or behaving out of guilt or a need to prove something, has been found to be positively associated with exercise, particularly among females (Duncan, Hall, & Wilson, 2010; Wilson, Rodgers, Fraser, & Murray, 2004). Duncan et al. (2010) found introjected regulation to predict exercise intensity for females, and Ingledew et al. (2008) found body related motives to be associated with introjections. However, Rogers, Hall, Duncan, & Pearson (2010) found that increases in introjection tended to occur in the early stages of exercise participation, meaning this type of motivation is less likely to lead to sustained healthy exercise behaviors.

The current study analyzes exercise motivations from the perspective of motives (goals) in order to compare the reasons why participants exercise with their fitness test results. For this purpose, the Exercise Motivations Inventory–2 (EMI-2) was used as a measure, as it allows for differentiation between a variety of motivational components (Kilpatrick, Hebert, & Bartholomew, 2005). The EMI-2 has been validated (Markland & Ingledew, 1997) and previously applied in exercise motivations research (Huang, Lee, & Chang, 2007; Kilpatrick et al., 2005, Maltby & Day, 2001). Similar to the self-determination theory literature, previous research has shown intrinsic motives, such as challenge, affiliation, and enjoyment, to be positively associated with exercise behavior (Teixeira et al., 2012). There have been mixed results in terms of how body-related and health/fitness motives affect exercise patterns. Generally, extrinsic motives, such as social recognition, appearance, and weight have been found to either not predict or negatively predict exercise behavior (Ingledew & Markland, 2008). However, some of the same motives, such as the body and health-related motives, can be perceived as either intrinsic or extrinsic motivations, depending on the characteristics of the individual and of the exercise. An example of such was made by Teixeira et al. (2012), where a person who is motivated for appearance reasons (extrinsic motives) could strive to seek praise from a partner (controlled motivation) and/or could personally value a fit appearance (autonomous motivation).

The current study contributes to the above body of knowledge by broadening the comparison of motives and participant-reported exercise patterns to include measures of physical fitness. Identifying specific motives that associate with various fitness levels could help professionals to tailor programs, facilities, and strategies to better suit the needs of those who struggle to sustain healthy exercise habits.

METHODOLOGY

Participant Recruitment

The study was conducted at a mid-sized (12,000 students) public university in the mid-western United States. Participants were recruited from a general education health and fitness course required for all undergraduate students. Instructors of the course sections agreed to include participation in the study as an optional way for students to earn "activity" points that counted toward their grade. The students who chose to participate self-registered using an online poll and provided their email address so they could be sent the consent forms, the online survey, and a scheduling poll for their fitness assessment. The course instructors shared on their course websites information about the study including how to prepare for the fitness assessments. Willing participants first completed the online survey about their exercise habits and motivations, and then did the fitness assessment.

Study Participants

During spring semester 2015, 1073 students were enrolled in the participating course sections, and a total of 241 (22%) participated in the study. One hundred seventy-two participants (71% of the total participants) completed all of the study components and provided usable data. The majority (61%) of participants were first year students, and most (91%) were traditional-aged (18-22yrs). The participant sample was evenly split by gender (Males: n = 85; Females: n = 86), and self-identified physical activity levels ranged fairly evenly from 2-5 (M = 3.49, SD = 1.18) on a 5-point Likert-type scale ranging from 1 (not active) to 5 (very active) (see table 1).

Table 1. Study Participant Demographics

Student Status	Gender	Age	Self-Described Physical Activity Level
First Year: 61% (n=104)	Male: 50% (n=85)	18-22yrs: 91% (n=157)	1. Not active: 5% (n=8)
Sophomore: 24% (n=41)	Female: 50% (n=86)	23-27yrs: 5% (n=9)	2: 17% (n=30)
Junior: 9% (n=15)		28+yrs: 4% (n=6)	3. Active: 27% (n=46)
Senior: 6% (n=11)			4: 26% (n=45)
			5: Very active: 25% (n=43)

Survey Contents and Data Reduction

The online survey was conducted using Qualtrics Online Survey Software and took participants an average of 18 minutes to complete. The survey inquired about student demographics, exercise patterns, fitness goals, and exercise motives.

Exercise Motivations Inventory-2. The Exercise Motivations Inventory-2 (EMI-2) was used to measure the participants' exercise motives (Markland & Ingledew, 1997). The EMI-2 is a 51-item measure, comprising 14 sub-scales of motivations including fitness, health, social, recreational, weight management, and stress management related categories. Participants rated the 51 items on a 6-point Likert scale from 1 (not at all true for me) to 6 (very true for me). The participant responses were factor analyzed using principal components extraction with varimax rotation. The resulting scree plots, eigenvalues, and factor loadings were examined to determine the appropriate number of factors for this dataset, and Chronbach's alpha coefficients were used to evaluate the internal consistency of each resultant factor. Our dataset represented a 12-component measure instead of the anticipated 14 (ill-health avoidance and positive health were combined, as were enjoyment and revitalization). Eight items were dropped from the 51-item question set because they did not load in such a way that corresponded with the EMI-2 categories or weakened the internal consistency of the categories. Overall, the most highly rated exercise motives were strength and endurance, appearance, ill-health avoidance and positive health, weight management, and enjoyment and revitalization. The lowest rated motives were affiliation and health pressures. Our final 12-component measure, with factor loadings ranging from 0.50 to 0.89 and strong internal consistencies, is summarized in Table 2.

Fitness Assessment Measures And Cluster Analysis. The fitness assessments were conducted in the university's exercise physiology laboratories, fitness center, and field house containing an indoor track. Lasting approximately 1.5 hours, the assessments included anthropometric tests (i.e., height, weight, waist/hip ratio, skinfold measurements, blood pressure, and resting heart rate), muscular strength assessments (i.e., leg press and bench press), muscular endurance tests (i.e., 1-minute push-ups and sit–ups tests), an aerobic capacity assessment (i.e., Cooper 1.5 mile run/walk test), and a flexibility test (sit-and-reach).

The assessments used in this study were chosen due to the following factors: probable familiarity with the test for the subjects; ease of administration/reliability in terms of completing the assessments; and validity (Golding, Myers, & Sinning, 1982; Heywood, 1998; Heyward, 2010; Jeukendrup & Gleeson, 2010; McArdle, 2000; Pollock & Wilmore, 1978;). An additional consideration, which eliminated more-sophisticated means of conducting VO_{2max} testing, was utilizing tests that could be administered to mid-sized groups in a reasonable amount of time.

Table 2. Exercise Motivation Components Following Factor Analysis[a]

Component	Grand mean	SD	Factor loading range	Cronbach α
Strength & endurance	5.36	0.80	0.69-0.78	0.85
Appearance	5.12	0.97	0.59-0.89	0.82
Ill-health avoidance & positive health	4.94	0.90	0.50-0.76	0.85
Weight management	4.62	1.19	0.82-0.85	0.79
Enjoyment & revitalization	4.60	1.25	0.63-0.82	0.93
Nimbleness	4.38	1.41	0.75-0.81	0.91
Challenge	4.38	1.35	0.63-0.85	0.85
Stress management	4.30	1.34	0.72-0.85	0.90
Competition	3.72	1.62	0.76-0.89	0.93
Social recognition	3.45	1.39	0.57-0.73	0.80
Affiliation	2.93	1.40	0.64-0.85	0.88
Health pressures	2.64	1.46	0.50-0.76	0.71

[a] Items measured on a Likert-type scale, where 1=not at all true for me, and 6=very true for me.

Five measures were selected out of the full slate of assessments for the purpose of providing an overview of the participants' fitness (see Table 3). One measure was selected to represent each of the five components of fitness (body composition, muscular strength, muscular endurance, aerobic capacity, and flexibility) based on three criteria: (a) researcher confidence in the reliability of the measure; (b) measure correlation with expected variables; and (c) appropriateness of the measure to represent the fitness component. The selected measures included the Brozek 7-site skinfold measure, 1-minute push-up test, estimated 1-rep bench press test, VO_{2max} based on a 1.5 mile run, and the sit-and-reach test for flexibility.

Cluster analysis procedures were conducted in order to group participants by fitness patterns. Agglomerative hierarchical clustering was conducted for the first iterations to examine models with various distances between clusters and numbers of clusters. The procedure was analyzed for three to six clusters, and the four-cluster grouping proved most appealing. Four criteria were used to select the most appropriate number of clusters: (a) members in each cluster should be as close to each other as possible; (b) each cluster should be different from the others; (c) each cluster should be large enough to allow further statistical analyses; and (d) each cluster's contents should be consistent with theory and should make intuitive sense (Halkidi, Batistakis, and Vazirgiannis, 2001). To validate the four-cluster grouping, the cluster analysis was repeated using K-means clustering and specifying four clusters. The results were similar to the four-group hierarchical grouping but provided more difference between groups while maintaining a reasonable sample size within each group. Table 4 defines the K-means four-cluster solution across the five fitness measures used for the analysis.

Table 3. Fitness Assessment Results Across the Selected Measures

Assessment Measure	Scale	Mean	Excellent / Good	Average / Fair	Poor / Very Poor	Correlations (r)	p
Brozek Skinfold[a]	1-5	2.21	66%	27%	7%	Bench Press: .43 Push-Up: .38 VO2 Max: .48 Sit & Reach: .25	<.001 <.001 <.001 <.01
Bench Press[b]	1-5	3.55	28%	13%	59%	Push-Up: .56 VO2 Max: .41 Sit & Reach: .29	<.001 <.001 <.001
Push-Up[c]	1-5	3.18	20%	44%	36%	VO2 Max: .35 Sit & Reach: .22	<.001 <.01
VO_{2max}[d]	1-6	3.71	47%	21%	32%	Sit & Reach: .07	>.05
Sit & Reach[e]	1-5	2.64	35%	65%	0%		

[a] Rating scale ranged from 1=athletic, and 6=obese.
[b] Rating scale ranged from 1=superior to 5=poor.
[ce] Rating scale ranged from 1=excellent to 5=poor.
[d] Rating scale ranged from 1=superior to 6=very poor.

The four cluster groups were (a) Overall Fit, (b) Strength, (c) Average, and (d) Least Fit. The Overall Fit group rated "excellent" or "good" across all of the fitness measures and therefore represented the best overall fitness of the sample. The Strength group rated "excellent" and represented the highest in muscular strength, however, scored average in muscular endurance and only fair in aerobic capacity. The Average group rated "good" or "fair" across all of the fitness measures, trending slightly lower in muscular strength and endurance compared to the other tests. The Least Fit group rated "acceptable" to "very poor" across the measures.

Data Analysis. One-way analyses of variance (ANOVA) with Tukey Honestly Significant Differences (HSD) tests for multiple comparisons (or where appropriate chi-squared (χ^2) tests) were used to examine the relationships between the fitness clusters, motivation components, student demographics, and self-reported exercise patterns. Effect size (eta-squared (η^2) or Cramer's V tests) was calculated to better understand the relationships between variables. Significance was reported at <0.05.

Table 4. Four Cluster Group Solution Showing Mean Scores for Each Assessment Rating[a]

Fitness Assessment	**Mean Scores[b]**							
	Overall fit	**Strength**	**Average**	**Least fit**	**Δ mean**	**F**	**p**	**η^2**
Skinfold	1.61_{a}	1.91_{ac}	2.16_{ac}	2.89_{bc}	1.28	18.83	<.001	0.53
Bench press	1.94_{a}	1.65_{a}	4.38_{c}	4.73_{b}	3.08	204.56	<.001	0.90
Push-up	2.36_{a}	2.70_{a}	3.48_{b}	3.64_{b}	1.28	23.88	<.001	0.57
1.5 mile run	1.94_{a}	4.26_{b}	2.96_{c}	5.58_{d}	3.64	197.81	<.001	0.90
Sit & Reach	2.48_{ab}	2.35_{a}	2.88_{b}	2.78_{ab}	0.53	4.09	<.05	0.28

[a] Rating scales for the measures are slightly different, however, 1 is always excellent/superior/athletic, and 5 or 6 is poor/very poor/obese.
[b] Mean scores with a common subscript letter do not differ significantly from each other at the .05 level.

RESULTS

The participant sample contained limited variety in terms of student status, age, and distance to campus. However, the data were examined for differences among the fitness clusters based on gender and several self-reported patterns, including how physically active the participants consider themselves to be, their rating of the importance of exercise, and whether they think they need more exercise (Table 5).

Based on Chi Square analysis, significant differences were evident between the clusters with respect to gender. The Strength cluster group was significantly different from the Least Fit and the Average cluster groups where there were a higher proportion of male participants in the Strength group (78% male) as compared with the other two groups, which were 36% and 45% male, respectively (χ^2=12.37, df=3, p<.01, Cramer's V=.29). The gender breakdown of the Overall Fit cluster group was not significantly different from the other groups, but contained more males (58%) as compared to females (42%). Related to this finding is that overall, male participants considered themselves to be more physically active than females participants ($F=15.16$, $p<.01$, $\eta^2=.29$). In the survey, participants indicated how physically active they consider themselves on a Likert scale ranging from 1, not active; to 5, very active. Male participants also held significantly better ratings in body fat ($\chi^2=42.76$, df=4, $p<.01$, Cramer's V=.50), bench press ($\chi^2=19.30$, df=4, $p<.01$, Cramer's V=.34), and flexibility ($\chi^2=9.73$, df=3, $p<.05$, Cramer's V=.24) . Females, on the other hand, rated significantly higher than the male participants in the muscular endurance test ($\chi^2=32.14$, df=4, $p<.01$, Cramer's V=.44). Males still outnumbered females in the excellent and good ratings, but, there were more females (n=-53) who rated "average" compared with 32 males in the lower rating, named "fair". There were no significant differences between the genders in the aerobic capacity test results.

Table 5. Differences in Gender, Self-Reported Exercise Patterns, and Exercise Perceptions Between Fitness Clusters

	Item Proportion / Mean Scores[a]						
	Overall Fit	**Strength**	**Average**	**Least Fit**	**F or χ^2**	**p**	**η^2 or Cramer's V**
Gender:							
Male	$58\%_{ab}$	$78\%_{a}$	$45\%_{b}$	$36\%_{b}$	$\chi^2=12.37$	<.01	Cramer's
Female	$42\%_{ab}$	$22\%_{a}$	$55\%_{b}$	$64\%_{b}$			V=.29
Percent meeting ACSM guidelines	$67\%_{a}$	$60\%_{ab}$	$46\%_{ab}$	$37\%_{b}$	F=2.89	<.05	$\eta^2=.27$
Consider themselves physically active[b]	4.42_{a}	3.83_{ab}	3.60_{b}	2.60_{c}	F=22.95	<.01	$\eta^2=.32$
Rating of exercise importance[c]	6.45_{a}	6.22_{ab}	5.68_{b}	5.47_{b}	F=5.11	<.01	$\eta^2=.16$
Feel they need more exercise[d]	3.94_{a}	4.87_{ab}	5.44_{b}	5.96_{b}	F=9.63	<.01	$\eta^2=.16$

[a] Percentages/scores with a common subscript letter do not differ significantly from each other at the .05 level.
[b] Item was measured on a 5-point Likert-type scale, where 1=not active, and 5=very active.
[c] Item was measured on a 7-point Likert-type scale, where 1=not at all important, and 7=extremely important.
[d] Item was measured on a 7-point Likert-type scale, where 1=completely disagree, and 7=completely agree.

There were also significant differences in how physically active participants within each of the cluster groups considered themselves to be. Participants in the Least Fit group had a mean rating of 2.6 which was significantly lower than the other three groups, and participants in the Average group (mean rating of 3.6) also considered themselves less physically active as compared to the Overall Fit group who had a mean rating of 4.42 ($F=22.96$, $p<.01$, $\eta^2=.32$). Also, according to their reported exercise patterns, significantly fewer participants in the Least Fit group met ACSM recommendations for cardiorespiratory exercise as compared to the Overall Fit group ($F=2.89$, $p<.05$, $\eta^2=.27$) where 67%, 60%, 46%, and 37% of the Overall Fit, Strength, Average, and Least Fit groups met the recommendations, respectively.

Similarly, participants were asked to rate the importance of exercise on a Likert scale ranging from 1 (not at all important) to 7 (extremely important). Participants in the Least Fit and Average cluster groups rated the importance of exercise lower than those in the Overall Fit group ($F=5.11$, $p<.01$, $\eta^2=.09$). The survey also asked participants to indicate, on a scale ranging from 1 (completely disagree) to 7 (completely agree) whether they need to exercise more than they currently do. Those in the Least Fit and Average cluster groups felt more strongly that they needed more exercise than those in the Overall Fit group ($F=9.63$, $p<.01$, $\eta^2=.16$).

Fitness Clusters and Exercise Motivations

In the online survey, participants were asked to rate on a scale of 1-10 how motivated they were to exercise (1=not motivated at all, 10=extremely motivated). Participants in the Overall Fit and Strength cluster groups rated themselves as significantly more motivated than the Least Fit group ($F=6.91$, $p<.01$, $\eta^2=.13$).

Table 6. Mean Differences in Exercise Motivation Component Ratings Between Fitness Clusters[a]

Exercise Motive	Mean Scores[b]							
	Overall Fit	Strength	Average	Least Fit	Δ mean	F	p	η^2
Strength & endurance	5.67_a	5.54_{ab}	5.41_{ab}	5.04_b	0.63	4.66	<.01	.30
Appearance	5.15_a	5.12_a	5.05_a	5.26_a	0.21	0.39	>.05	.01
Positive health	4.80_a	4.79_a	4.91_a	5.08_a	0.29	0.80	>.05	.02
Weight Management	4.55_{ab}	4.13_a	4.47_a	5.18_b	1.05	5.15	<.01	.31
Enjoyment & revitalization	5.14_a	4.94_a	4.66_a	3.88_b	1.26	8.40	<.01	.15
Nimbleness	4.17_a	4.48_a	4.43_a	4.26_a	0.31	0.33	>.05	.01
Challenge	4.91_a	4.46_{ab}	4.30_{ab}	4.03_b	0.88	2.82	<.05	.05
Stress management	4.36_a	4.55_a	4.35_a	3.95_a	0.60	1.25	>.05	.03
Competition	4.30_a	4.33_a	3.57_{ab}	3.12_b	1.21	5.13	<.01	.31
Social recognition	3.59_{ab}	4.19_a	3.40_{ab}	3.04_b	1.15	3.85	<.05	.27
Affiliation	3.42_a	3.06_{ab}	2.90_{ab}	2.58_b	0.84	2.49	>.05	.05
Health pressures	2.30_a	2.54_a	2.46_a	2.94_a	0.64	1.48	>.05	.03

[a] Items measured on a Likert-type scale, where 1=not at all true for me, and 6=very true for me.
[b] Mean scores with a common subscript letter do not differ significantly from each other at the .05 level.

While the Overall Fit and Strength groups were generally more motivated compared to the Least Fit group, specific motivational components were important for each group (Table 6). Six of the twelve components of exercise motivations differed significantly between the fitness cluster groups. The Overall Fit group rated strength and endurance, enjoyment and revitalization, challenge, competition, and affiliation significantly higher compared to the Least Fit group. The Least Fit group was more motivated by weight management as compared to the Strength and Average groups. Although social recognition received lower ratings across the board, it was rated higher by the Strength group than the Least Fit group.

CONCLUSIONS

The purpose of this study was to explore how fitness ratings relate to exercise patterns and motivations. Our analysis has identified several trends which provide insight regarding exercise behaviors and warrant further investigation. Consistent with Monroe et al. (2010), the study participants' self-reported exercise patterns and ratings of exercise importance correlated with their actual fitness ratings, suggesting their concepts of their own progress and fitness were at least somewhat in line with their reality. Further research is needed, however, to better examine the accuracy of college students' fitness perceptions and their understanding of the level of performance that can be achieved by adhering to the ACSM guidelines for physical activity. Investigations of this nature are important for the college demographic considering the current national trends of inactivity (CDC, 2007) and the CDC's finding that activity levels tend to decrease with age in adulthood (CDC, 2014). Overall, the sample of college students demonstrated moderate fitness abilities. The sample ranged from an Overall Fit group (22%) who rated in the excellent-good range across all fitness measures, to the Least Fit group (30%) who rated average/acceptable to very poor, depending on the measure. Fifty-two percent of the study sample (Female: 43%; Male: 61%) met or exceeded ACSM recommendations for cardiorespiratory exercise. The overall proportion was consistent with the 2014 CDC report (CDC, 2014); however, the gender breakdown in this study demonstrated a greater proportion of male participants meeting ACSM standards as compared to the 2014 National College Health Assessment data (ACHA, 2002).

Our whole sample demonstrated good-acceptable mean body composition ratings. However, the effect of decreasing activity levels, combined with natural processes associated with aging (i.e., loss of muscle mass, lower metabolism), may prevent this pattern from persisting throughout adulthood. This decline may occur even if older adults maintain the same exercise and nutritional habits due to metabolism slowing with age (Fukagawa, Bandini, and Young, 1990). Any findings that help young adults understand the positive results associated with regular exercise and the implications of inactivity, or that help professionals to effectively motivate the college populations, will be important toward reversing the obesity trend.

A consideration of the mean cluster ratings of the motivation components for each of the fitness groups provided context for the college sample and lead to several important research questions. Appearance was among the top three most highly rated motivation factors for all four fitness groups. Being an extrinsic motivator, appearance has generally been found to be negatively associated with exercise behavior (Ingledew & Markland, 2008). Our data would suggest that appearance was important for everyone, but that it may not have been the motive that actually drove those who were committed to fitness, since those who were not committed rated it equally high. A more comprehensive study into appearance motives for college students may help to better understand whether appearance is, in fact, an external motive, or whether the reasons for wanting to improve one's appearance are more complex (Teixeira et al., 2012).

Strength and endurance was also among the top three motives for all of the fitness groups except for the Least Fit group. With survey questions such as "to build up my strength", "to increase my endurance", and "to get stronger," this motive could also either be an autonomous motive (i.e., the participant values being strong and fit) or a more controlled motive (i.e., the participant wants praise for his or her performance) (Teixeira et al., 2012). The Overall Fit group rated this motive higher than the Least Fit group, making it particularly interesting for further research.

Enjoyment and revitalization was rated among the top three motives for the two fit groups, and the two areas were rated significantly higher than the Least Fit group. This is more of an intrinsic motive characteristic of self-determined patterns and is likely important for sustaining commitment to exercise (Markland & Tobin, 2010). Enjoyment was rated higher than challenge and stress management, which are other intrinsic motives one could expect to be prevalent within the college demographic. In order to develop strategies to reach those students less motivated, further research is warranted into what activities and exercise environments college students enjoy the most.

Social recognition was rated higher by the Strength group that performed well in muscular strength but worse in cardiorespiratory endurance than other groups. From the perspective that muscular strength is the most quantifiable of all fitness categories, it makes sense that a group seeking social recognition would perform well in the most easily-compared measures of fitness. A concern, however, is that social recognition is generally considered an extrinsic motive, which has not been associated with sustained exercise patterns (Ingledew & Markland, 2008).

The Least Fit group rated appearance and health benefits among their top three, along with weight management. This group understood the connection between appearance, health, and exercise; however, knowledge was not enough to motivate them to sustain exercise behaviors. Moreover, they were extrinsically motivated to lose weight and had less intrinsic motivation in terms of enjoying exercise. They did not yet have a sense for how they intrinsically "needed" exercise to fulfill their personal, professional, and relational goals. Programs for helping this group would benefit from more research about how they experience exercise, and about their preferred exercise support structures.

Limitations

One limitation of this research was the voluntary participant recruitment process. Students were awarded course credit for participating in the study; however, they also had several alternative options for receiving the credit. Twenty-two percent of the course-enrolled students chose to participate in the study. It would seem likely that students who are more physically fit would choose to participate in the study over those more sedentary and less fit; however, the alternative options for course credit were each worth fewer points in comparison and each involved a significant time commitment. Also, the overall fitness measure results of the study suggest the sample was relatively similar to national norms (CDC, 2014).

A second limitation of this study was the use of an online survey to collect demographic information, exercise patterns, and exercise motivations data. There is no guarantee that the survey respondents represented themselves accurately throughout the online survey (Wright, 2006).

Implications

This is one of the few studies that compare fitness ratings with exercise motivations, and it also contributes to an emerging body of literature evaluating the accuracy with which people self-evaluate their exercise patterns. The motivation patterns identified in this study demonstrate clear trends such as the importance of self-determined, autonomous motivations for exercise as demonstrated by the top fitness groups' high ratings of enjoyment and revitalization. To the contrary, the Least Fit group was more motivated than the other groups by weight management, which is an external motive that previous studies suggest is negatively correlated with physical activity. Some of the trends that were identified in this study warrant further inquiry, such as the prevalence of appearance as a top-rated motive across all of the fitness groups. We suspect that appearance as a motivator contains a variety of meanings across the sample, and we suggest that a better understanding of these complexities could help to develop strategies to better motivate target groups.

The bulk of exercise motivation literature relies on participant-reported exercise patterns, yet relatively few studies have evaluated the accuracy with which a person's reported patterns associates with their physical fitness. The trends across the fitness rating groups in this study were consistent with the self-reported exercise patterns in the survey. However, further research is needed before we can rely on the accuracy with which groups of different demographics report and assess their physical activity patterns. Also, additional studies connecting exercise motivations to fitness ratings could help wellness practitioners better understand the needs and preferences of clients and community members.

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